

Dianella nigra

Earina autumnalis

Earina mucronata

Freycinetia banksii

Gahnia lacera

Gahnia pauciflora

Gahnia setifolia

Gahnia xanthocarpa

Libertia grandiflora

Microlaena avenacea

Microlaena stipoides

Microtis unifolia

Oplismenus hirtellus

Phormium tenax

Poa anceps

Pterostylis agathicola

Pterostylis banksii

Pterostylis trullifolia

Rhopalostylis sapida

Ripogonum scandens

The vegetation and flora of Shakespeare Cliff Reserve and environs, Mercury Bay

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Introduction and history

Shakespeare Cliff Scenic and Historic Reserve (hereafter referred to as 'Shakespeare Cliff Reserve' or 'the Reserve'), managed by Thames-Coromandel District Council (TCDC), is located between Cooks Beach and Maramaratōtara Bay (of which the eastern part is commonly known as Flaxmill Bay) (NZTM E5587599 N1833491) in Mercury Bay (Fig. 1). Mercury Bay is an inlet on the east coast of Coromandel Peninsula, which is part of a drowned valley system divided into two portions; the outer one is Mercury Bay, and the inner one a south-

western extension of the Whitianga Harbour or River (teara.govt.nz). Mercury Bay was previously called Te Whanganui-o-Hei (The Great Bay of Hei) and was named after an important Māori chief, Hei, who arrived on the Te Arawa waka. The local iwi (tribe) is called Ngāti Hei and the chief's name was also given to the nearby town of Hahei.

Lieutenant James Cook arrived in the bay in November 1769 and set up his shore station at Cooks Beach. On 9 November¹, Cook and Charles Green observed the transit of Mercury at the

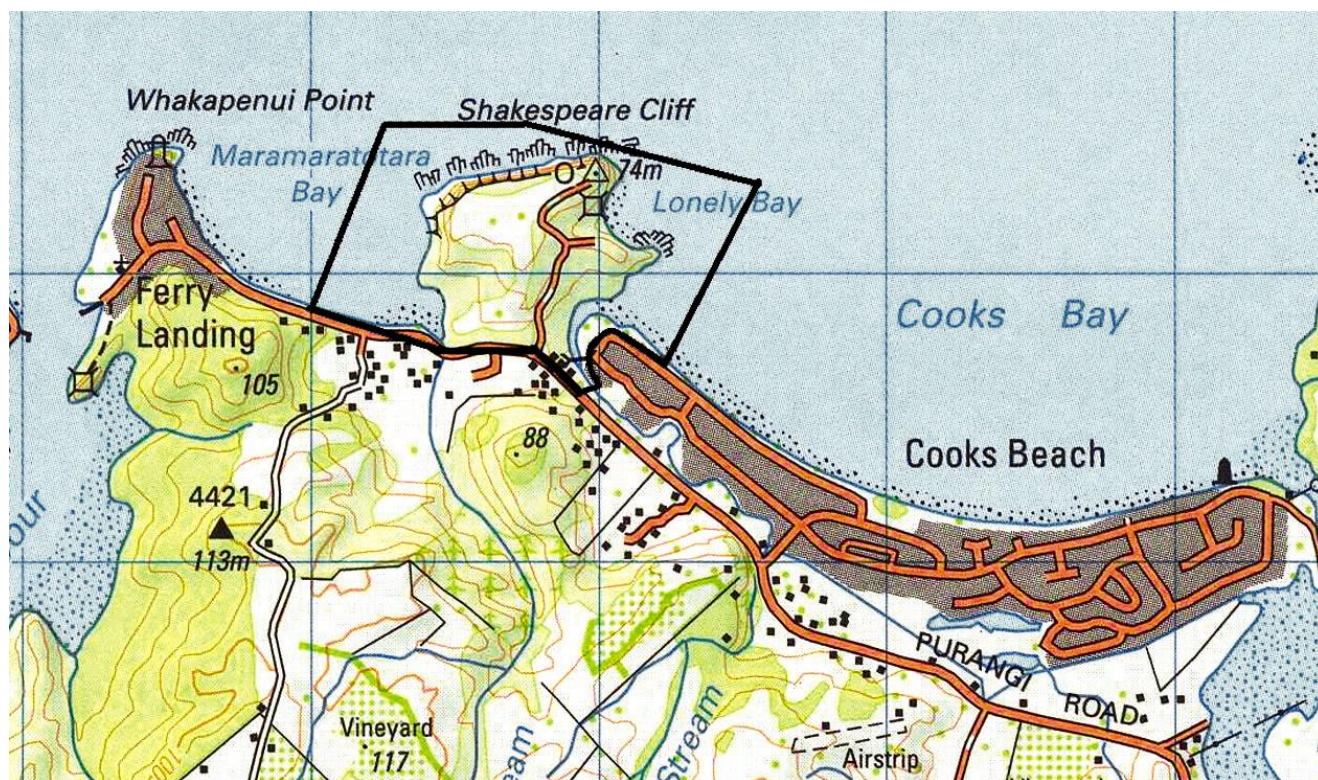


Fig. 1. Location of Shakespeare Cliff Reserve and BioBlitz boundary (black outline), Mercury Bay (National Library of NZ topographic map, modified by NG).

eastern end of the beach, near the Purangi River. They did this in order to determine the longitude and thereby, establish the exact position of New Zealand on the world map. As a result of this, Cook named the area "Mercury Bay". This event is commemorated by a sculpture at the east end of Cooks Beach (Fig. 2), and a plaque located at the highest point (the lookout) of Shakespeare Cliff Reserve (c.72 m asl) together with a memorial stone for the visit of Queen Elizabeth II to mark the bi-centenary of Cook's visit in March 1970. Shakespeare Cliff was given its name by Cook as he thought the profile of the cliff at the western end of Cooks Beach resembled the profile of Shakespeare Cliff at Dover – which was "a welcome sight for sailors beating up the English channel" (signage at the monument at east end of Cooks Beach). "Paparoa" is the Ngāti Hei name for the cliff (A. Smaill, pers. comm.).

A recorded pa site on the Reserve overlooks Mercury Bay and a midden is located at Lonely Bay (Te Rakatai). In 1919, on the erroneous assumption that Cook's observatory had been sited on Shakespeare Cliff, action was taken to acquire the land as an historic reserve. Accordingly, in the early 1920s, some 88 acres (35.6 ha) were set aside there and a monument erected to commemorate Cook's visit (teara.govt.nz).

A local family, the Morcoms, held a grazing lease for part of the Reserve where they grazed sheep and cattle up until the mid 2000s (A. Smaill, pers. comms.).

Landform, soils and geology

Shakespeare Cliff Reserve is a very prominent headland feature that is characterised by impressive cliffs, promontories and coves, bounded by rock stacks and shelves along its western and northern boundary (Fig. 3). The topography is broadly defined by three large gully systems which drain into Maramaratōtara Bay, Lonely Bay, and the tidal reaches of Cook Stream (at the western end of Cooks Beach). The latter two gullies support hard-bottomed intermittent streams, while the shallow gully at Flaxmill Bay drains into a small wetland. The expansive central and northern parts of the Reserve roll away gently towards the northern and northwestern cliffs.

The headland is an eroding remnant of Pumpkin Rock Ignimbrite that was erupted from the northern end of the Kapowai Caldera (vicinity of the head of Whitianga estuary) around 6 million years ago (Skinner 1995; Bruce Hayward, pers. comm.).



Fig. 2. The recent bronze sculpture at east end of Cooks Beach commissioned by Tuia 250 and created by Bill Hayes, near the spot where Cook and Charles Green observed the transit of Mercury on 10 Nov 1769. Photo: EKC, 11 Feb 2020.

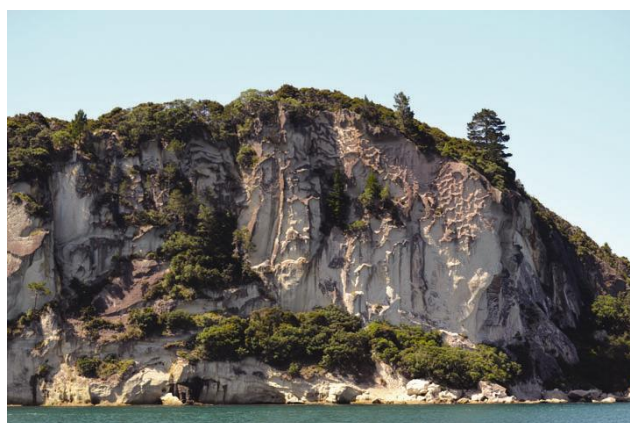


Fig. 3. Western ignimbrite cliffs of the Reserve. Photo, taken from a boat: NG, 7 Jan 2014.

This ignimbrite rock has a distinctive pale cream colour and the soils are Orthic Brown. The sheer western cliff faces of Shakespeare Cliff Reserve have been subjected to significant slips over the past few decades. Nowadays the evidence of these dramatic events has been all but covered by the likes of regenerating pōhutukawa (*Metrosideros excelsa*), while at the base of the western cliffs the colluvium of a more recent slip has been colonised by brush wattle (*Paraserianthes lophantha*).

The Flora of Shakespeare Cliff Reserve and environs

Joseph Banks and Daniel Solander recorded some 226 indigenous wild vascular species while the *Endeavour* was at anchor in "Opuragi" Mercury Bay, 5–15 November 1769 (EKC & Hatch unpubl.).

¹ Six days later, on 15 November 1769, Cook raised the British Colours at Mercury Bay, claiming the area in the name of King George III.

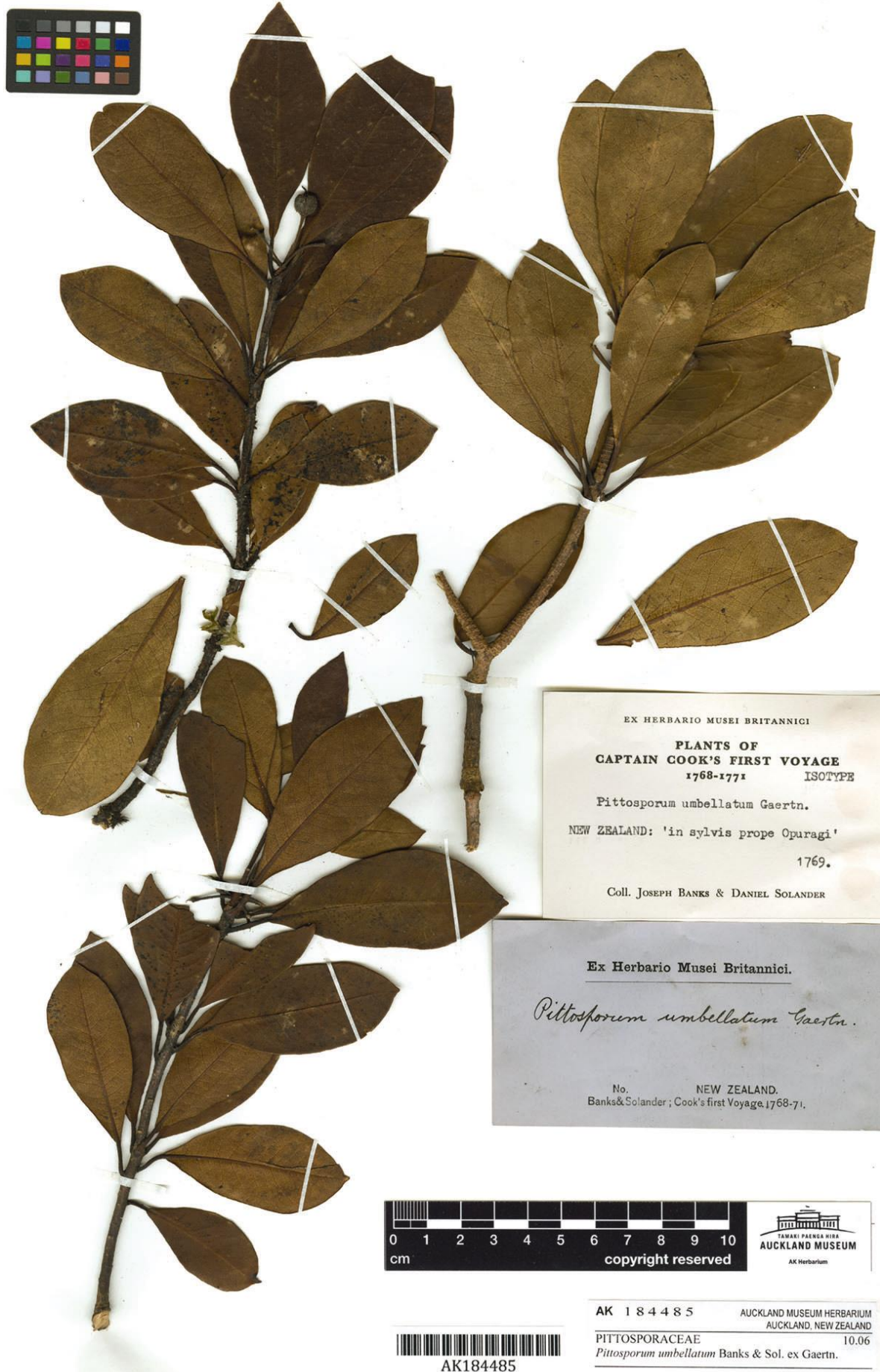


Fig. 4. Haekaro (*Pittosporum umbellatum*) specimen collected by Banks and Solander in Nov 1769 in Mercury Bay, perhaps in the Shakespeare Cliff Reserve itself where it is frequent in the exposed shrublands and forest. AK 102344, gifted to the Auckland Museum by Natural History Museum, London (BM).

One-hundred and nine species, 48% of their list, were recorded during a BioBlitz centered on the Shakespeare Reserve in March 2020 (see Appendix). Note that while at the Mercury Bay anchorage Banks and Solander ventured about on foot and also in the smaller boats across to Wharekaho on the north side of Mercury Bay, up the Purangi River and up the Whitianga Harbour (Project Gutenberg Australia 2005), which is well-illustrated on the wall at the local Mercury Bay Museum in Whitianga. Banks and Solander collected the first scientific specimens in the area, and for 35 of these collections they were the only records made of these species for that voyage. One such record was haekaro (*Pittosporum umbellatum*) (Fig. 4), to which they gave the manuscript name 'Pittosporoides umbellata'. Joseph Gaertner formally published this species as *Pittosporum umbellatum* in 1788 based on the Banks & Solander specimens and description from Mercury Bay.

It is likely that much of the original forest was burnt or cleared by Maori, so their collections/records are more indicative of seral or regenerating forest and shrubland, albeit without any naturalised plant species. Two hundred and fifty years later, the Reserve was botanised by a team led by EKC as part of the Mercury Bay community BioBlitz event held at Cooks Beach from 5 to 7 March 2020 (Cameron in prep.). The vegetation descriptions in this article are based on the BioBlitz findings and also draw on

several botanical forays undertaken by Nick Goldwater between 2013 and 2019. Additional species and background information have also been provided by local resident Adele Smaill, who has previously undertaken pest plant control in the Reserve for the Cooks Beach Ferry Landing Reserves Management Group and TCDC.

The wild vascular plants total 317 species for the BioBlitz area (see Fig. 1), of which 56% are indigenous, and the planted flora totals 58 species (79% indigenous species), of which 34 are additional to the wild flora (see Table 1 and Appendix). Aspects of the flora are further discussed below.

Forest

Kānuka (*Kunzea robusta*) is the dominant forest canopy species, and is particularly abundant on the western side of the Reserve (Fig. 5). Under taller kānuka (up to 8m in height), the understorey (Fig. 6) is often dominated by mingimingi (*Leucopogon fasciculatus*), while frequent and occasional species include hangehange (*Geniostoma ligustrifolium*), shiny karamū (*Coprosma lucida*), twiggy coprosma (*C. rhamnoides*), kūmarahou (*Pomaderris kumeraho*), prickly mingimingi (*Leptecophylla juniperina*), and māpou (*Myrsine australis*). Broadleaved canopy species occur in this forest type and include tōwai (*Weinmannia sylvicola*), rewarewa (*Knightia excelsa*), haekaro (*Pittosporum umbellatum*), and pōhutukawa. Ponga (*Cyathea*

Table 1: Total numbers of wild and planted vascular plants from the Mercury Bay Tiaki Mauri BioBlitz (see Appendix).

Plant group – Wild Species	Indigenous	Naturalised	Totals
Ferns	36	-	36
Conifers	2	2	4
Dicot trees and shrubs	53	13	66
Dicot herbs	17	64	81
Dicot mistletoe	1	-	1
Dicot climbers and trailers	11	9	20
Monocot trees, shrubs and herbs (excluding the groups below)	8	11	19
Monocot climbers	1	1	2
Rushes	3	2	5
Sedges	26	3	29
Orchids	8	-	8
Grasses	11	35	46
Wild totals	177	140	317
Plant group – Cultivated species	Indigenous	Exotic	Totals
Planted conifers	7 (5)*	1	8 (5)
Planted dicots	32 (16)	9 (8)	41 (24)
Planted monocots	7 (3)	2 (2)	9 (5)
Planted Totals	46 (24)	12 (10)	58 (34)

* Figures in parenthesis are the number of species only observed cultivated (i.e. not seen wild)



Fig. 5. Mature kānuka forest on the southwestern slopes of the Reserve. Photo: EKC, 3 Mar 2020.

dealbata) is local in the sub-canopy while species such as *Dracophyllum sinclairii* and houpara (*Pseudopanax lessonii*) occur occasionally.

There are notable differences in the understorey and ground tier vegetation throughout this forest type. Some areas are bare apart from a few scattered seedlings and frequent patches of the moss, *Ptychomnion aciculare* (reminiscent of Kawau Island), while other areas support a gumland-type vegetation with abundant wīwī (*Schoenus tendo*) and locally common rārahu (*Pteridium esculentum*) together with frequent to occasional sword sedge (*Lepidosperma laterale*), *Morelotia affinis*, and tarangārara (*Gahnia lacera*). Pukupuku (*Doodia australis*) is also locally common on the forest floor, while *Microlaena stipoides* is frequent in more open areas and beside the western walking track.

An exceptional example of pōhutukawa forest fringes the beach at Lonely Bay (Fig. 7) and is bounded inland by a steep bluff. The dense sub-canopy is characterised by houpara with kawakawa



Fig. 7. Pōhutukawa forest at Lonely Bay, with Cooks Beach visible in the background. Photo: NG, 5 Jan 2017.



Fig. 6. Hangehange, *Coprosma rhamnoides* and mingimingi in the understorey of kānuka forest. Photo: NG, 4 Jan 2017.

(*Piper excelsum*) in the understorey (Fig. 8), including karo (*Pittosporum crassifolium*) by the coast, with large capsules to 30 mm across. Huge ignimbrite boulders are a feature of this forest, and in several instances they have become engulfed by large pōhutukawa roots. Frequent understorey species include shining spleenwort (*Asplenium oblongifolium*) and *Astelia banksii* (Fig. 9). An excellent view of the pōhutukawa forest is afforded from the top of the bluff at the SE end of Lonely Bay (see Fig. 7). The top of the bluff is fringed by rengarenga lily (*Arthropodium cirratum*) (Fig. 8), behind which is dense scrub characterised by kānuka, karamū, houpara and māpou over an understorey of hangehange, kawakawa, and pigeonwood (*Hedycarya arborea*).

The best broadleaved forest seen, apart from the pōhutukawa forest at Lonely Bay, was a small pocket dominated by kohekohe (*Dysoxylum spectabile*) in a sheltered, relatively damp part of the Reserve



Fig. 8. Looking down into a sub-canopy of houpara in the pōhutukawa forest at Lonely Bay. Photo: NG, 28 Oct 2013.

bounding the estuary at the western end of Cooks Beach. It is still a regenerating forest and the kohekohe were either saplings or young adults; the largest seen was 40 cm dbh. This species was scarcely seen wild elsewhere in the Reserve. Other prominent canopy trees include pōhutukawa and tall kānuka; karaka (*Corynocarpus laevigatus*), *Pseudopanax arboreus* and along the coastal edge houpapa was locally common. Tree ferns were present: ponga (frequent) and whekī (*Dicksonia squarrosa*) local. Vines and climbers were frequent here, including: *Metrosideros perforata*, *Rubus cissoides*, *Parsonsia ? heterophylla*, *Ripogonum scandens*, thread fern (*Icarus filiformis*) (locally common) and *Lygodium articulatum*. Ground species included: kiokio (*Parablechnum novae-zelandiae*), *Pneumatopteris pennigera*, *Pterostylis banksii*, *Ranunculus reflexus*, *Carex* spp., nīkau (*Rhopalostylis sapida*) (mainly trunkless), and a single pūriri (*Vitex lucens*) seedling was seen. Epiphytes included: *Asplenium polyodon*, *Tmesipteris* spp., *Earina mucronata*, *Phlegmariurus billardierei*, *Bulbophyllum pygmaeum*, and small patches of *Hymenophyllum demissum* and *H. flabellatum*. Slightly up-slope was the tallest kauri (*Agathis australis*) seen in the Reserve at c.15 m – evidently planted (Adele Smaill, pers. comm.).

Scrub and shrubland

Low, windswept scrub and shrubland punctuated by emergent radiata pine (*Pinus radiata*), haekaro, houpapa, rewarewa, pōhutukawa and mature kānuka occurs on the eastern slopes of the Reserve (Fig. 10). The vegetation is characterised by co-dominant kānuka and mānuka (*Leptospermum scoparium* agg.) with commonly occurring Coromandel tree daisy (*Olearia townsonii*) (Fig. 11) and frequent māpou, mingimingi and prickly mingimingi, as well as occasional koromiko (*Hebe macrocarpa* and *H. pubescens* were the two main species) and māhoe (*Melicytus ramiiflorus*). *Schoenus tendo* is locally abundant in the understorey while *Gleichenia dicarpa* and kiokio are local in open, less exposed parts. Kiokio and pēpepe (*Machaerina sinclairii*) occur together on seeps and shaded banks close to the track that leads to Lonely Bay and also along the foot of the cliffs at the northwest end of Cooks Bay (Fig. 12).

Dunes, strand vegetation, and rock stacks

Lonely Bay has a small area of low dunes where the cover of pōhutukawa is less prevalent. The dunes are characterised by a mixture of spinifex (*Spinifex sericeus*), knobby clubrush (*Ficinia nodosa*), and locally common gladiolus (*Gladiolus undulatus*). Harakeke (*Phormium tenax*) is local in a small dune slack into which a small, forested stream drains. Several large ngaio (*Myoporum laetum*) grow beneath the pōhutukawa along the southern half of Lonely Bay.



Fig. 9. *Asplenium oblongifolium* and *Astelia banksii* in dappled sunlight under a canopy of tall pōhutukawa. Photo: NG, 5 Jan 2017.

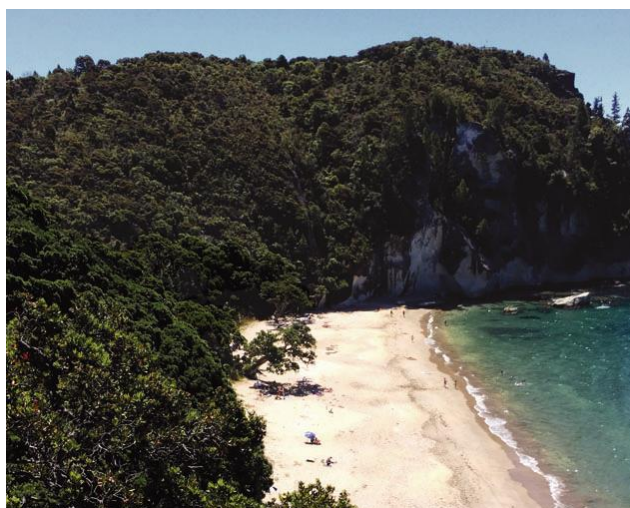


Fig. 10. Dense scrub and shrubland on steep slopes at north end of Lonely Bay. Photo: NG, 5 Jan 2017.



Fig. 11. *Olearia townsonii* in flower near the Lonely Bay track. Photo: NG, 5 Jan 2017.



Fig. 12. A large clump of pēpepe (*Machaerina sinclairii*) common in this seepage area, this one c. 6 x 8 m overhanging the tide at the northwest end of Cooks Beach. Photo: EKC, 12 Feb 2020.

At Flaxmill Bay, which abuts Shakespeare Cliff, *Carex pumila* is common on sand where disturbance by people is minimal. Saltwater paspalum (*Paspalum vaginatum*) has invaded damp sand flats and threatens to out-compete some of the *Carex pumila*. A sandy terrace on the true right side of a brackish stream that discharges into Flaxmill Bay (originating from a catchment to the south of the Reserve) supports a mixture of abundant oioi (*Apodasmia similis*) with frequent tall fescue (*Lolium arundinaceum*) and knobby clubrush, and occasional harakeke (Fig. 13). Saltwater paspalum is common with frequent buffalo grass (*Stenotaphrum secundatum*).

The dunes on the western end of Cooks Beach are dominated by spinifex and several exotic species, including haretail (*Lagurus ovatus*), evening primrose (*Oenothera glazioviana*), Formosan lily (*Lilium formosanum*), fleabane species (*Erigeron*



Fig. 14. *Gleichenia dicarpa* in the wetland at Flaxmill Bay. Note emergent ponga, māpou, and the now deceased Lombardy poplar. Photo: NG, 28 Oct 2013.



Fig. 13. Sandy terrace at Flaxmill Bay covered by oioi, knobby clubrush, tall fescue and scattered harakeke. Photo: NG, 4 Jan 2017.

canadensis and *E. sumatrensis*), saltwater paspalum, and until recently ice plant (*Carpobrotus chilensis*) that was locally eradicated. Less commonly present are the native species of pohuehue (*Muehlenbeckia complexa*), *Oxalis rubens*, *Lachnagrostis billardiarei*, and the occasional clumps of pīngao (*Ficinia spiralis*, also planted). In the more stable areas knobby clubrush is common (often planted as well), and low shrubs of sand daphne (*Pimelea villosa*) are very local (supplemented with adjacent plantings). At the back of the dunes shrubs of akeake (*Dodonaea viscosa*) and pōhutukawa are locally doing well, as are swards of buffalo grass.

Rock stacks carved out by the sea are dotted around the base of the cliffs on the western and northern boundary of the Reserve. Vegetation is sparse and includes *Astelia banksii*, gorse (*Ulex europeaus*), New Zealand iceplant (*Disphyma australe*), and *Asplenium ?haurakiense*. Exotic



Fig. 15. Downstream view of Cook Stream bounded by saltmarsh vegetation. Photo: NG, 7 Mar 2020.

grasses such as sweet vernal (*Anthoxanthum odoratum*) and danthonia (*Rytidosperma racemosum*) have invaded most of the rock stacks.

Freshwater and saline wetlands

At the base of Shakespeare Cliff Reserve (southwest side) a small freshwater wetland is present, dominated by *Gleichenia dicarpa* (Fig. 14) with locally common *Machaerina rubiginosa*, *Carex lesssoniana* and swamp millet (*Isachne globosa*), and occasional emergent mānuka and harakeke. The ephemeral nature of the wetland has allowed dryland species to establish, including ponga, mamaku (*C. medullaris*), māpou and houpapa. Blackberry (*Rubus fruticosus* agg.) was frequent in the wetland before being controlled in summer 2010–11, and currently only a few plants remain. A small infestation of kahili ginger (*Hedychium gardnerianum*) also used to be present, but this has since been controlled. There is one tall Lombardy poplar (*Populus nigra*) at the rear of the wetland, looking more than a little out of place. This has recently been poisoned and left to breakdown in situ. The wetland is well-buffered by the surrounding kānuka forest. Interestingly, the formation of the walking track along the seaward edge of the wetland has likely contributed to a more stable hydrology by partially impounding water draining the sub-catchment.

A long, narrow swathe of saltmarsh bounds the estuarine reach of Cook Stream and comprises oioi, sea rush (*Juncus kraussii*) and mangroves (*Avicennia marina*) with scattered saltmarsh ribbonwood (*Plagianthus divaricatus*) (Fig. 15). Residential properties abut much of the northern boundary of the saltmarsh, while indigenous shrubland provides some buffering along the southern margin.

Trackside and roadside vegetation

The walking track down to Lonely Bay offers the opportunity to inspect delicate herbs such as the insectivorous sundew *Drosera auriculata* with its tiny mauve flowers, and other diminutive species such as *Gonocarpus incanus*, pātōtara (*Styphelia nesophila*), and *Lindsaea linearis* (Fig. 16). Competing for space are seedlings of kiokio, koromiko and Coromandel tree daisy. Naturalised herbs such as oxeye daisy (*Leucanthemum vulgare*), sow thistle (*Sonchus oleraceus*) and catsear (*Hypochaeris radicata*) are common. The sun orchid *Thelymitra longifolia* (Fig. 17) is an ephemeral presence in the summer months along most of the tracks through the Reserve, favouring leached soils in sunlit areas. *Morelotia affinis* occurs frequently along the track that follows the cliff on the western edge of the Reserve with occasional *Carex uncinata* and *C. banksiana*.

Exposed clay road cuttings provide good habitat for an interesting assemblage of species that includes sun orchids (*Thelymitra* spp.), *Pomaderris*



Fig. 16. *Lindsaea linearis* amongst lichen on the side of Lonely Bay track. Photo: NG, 4 Jan 2017.



Fig. 17. *Thelymitra longifolia* in flower, western cliff track. Photo: NG, 28 Oct 2013.



Fig. 18. *Lycopodiella cernua* locally common on edge of road leading to lookout. Photo: NG, 28 Oct 2013.



Fig. 19. Three of the six pōhutukawa 'islands'. They are composed of up to six pōhutukawa trees planted close together to form a single 'island'. Photo: Joshua Salter, 6 Mar 2020.



Fig. 20. Planted *Pseudopanax laetus*, kānuka, rewarewa, and tī kōuka on the southern slopes of the Reserve. Photo: NG, 4 Jan 2017.

rugosa, *Drosera auriculata* and *Lycopodiella cernua* (Fig. 18). Seedlings of kānuka, mingimingi and gorse can also be found in these areas.

Planted vegetation

Six 'islands' of pōhutukawa occur in a large open area of mown lawn at the top of the Reserve (Fig. 19) and were planted just prior to the Queen's visit in 1969 (A. Smaill, pers. comm.). These 'islands' currently support a dense understorey of kawakawa, taupata (*Coprosma repens*), māpou, and māhoe. Harakeke occasionally occurs on the open margins of these islands. Two indigenous species that do not naturally occur in 'mainland' Coromandel – *Arthropodium bifurcatum* and *Astelia chathamica* – have been planted in at least one of these 'islands'.

According to local resident Adele Smaill, the visit by the Queen was the catalyst for more extensive replanting throughout the Reserve. Many trees and shrubs that are present at the Reserve today were sourced from nearby farms – an excellent example of eco-sourcing in practice.

Extensive plantings have been undertaken on the southern slopes of the Reserve in what used to be pasture (Fig. 20). Notable species include pūriri, kahikatea (*Dacrycarpus dacrydioides*), rimu (*Dacrydium cupressinum*), ngaio and kāpuka (*Griselinia littoralis*). Most of these plants have established well, no doubt helped by the less exposed aspect and moister soils.

Kauri has also been planted at various locations of the Reserve as part of the Kauri 2000 initiative to plant 45,000 kauri seedlings around the Coromandel peninsula. Former Prime Minister Helen Clarke planted the 10,000th kauri at Shakespeare Cliff in 2001 (Kauri 2000 website). Despite there being little evidence that the Reserve originally supported kauri forest, the planted kauri that are thriving today are symbolic of the tree that was once so abundant on the peninsula.

Threatened plant species

Excluding kauri and myrtle species, there are at least seven threatened plant species known from Shakespeare Cliff Reserve and adjacent dunes at the western end of Cooks Beach occurring naturally: *Deyeuxia quadriseta* (At Risk–Declining), pīngao (At Risk–Declining), *Korthalsella salicornioides* (Threatened–Nationally Critical), *Pimelea longifolia* (At Risk–Declining), *Pomaderris rugosa* (At Risk–Naturally Uncommon), sand daphne (At Risk–Declining), and *Olearia pachyphylla* (Threatened–Nationally Critical)², the latter of which was last recorded in 1992 (AK 213612). One wild individual of

² Threat rankings for indigenous vascular plants are from de Lange *et al.* (2018).



Fig. 21. *Pimelea longifolia* in flower, near lookout. Photo: NG, 4 Jan 2017.

Pimelea longifolia lives a tentative existence on the side of a track leading down to Lonely Bay from near the lookout (Fig. 21), while at least one other plant occurs in the southwest of the Reserve at the top of an old slip (A. Smaill, pers. comm.).

Pest plants

Wilding pines (*Pinus pinaster*, *P. radiata*) are the most conspicuous pest plant at Shakespeare Cliff Reserve, having invaded the steepest of cliff faces (Fig. 3). Work has been ongoing for more than 20 years to control pines, with many mature trees having been removed. More recently, contractors using abseiling equipment were employed by Council and the Reserves Management Group, with funding contributed by the community to control pines occupying steep slopes and cliff faces (A. Smaill, pers. comm.). Presently, only a few scattered pines remain. Given the current trajectory of the vegetation, as long as there are no major disturbances such as fire, it is hoped that there will be fewer gaps for pines to invade. A large planted maritime pine (*P. pinaster*) tree still stands at the west end of Cooks Beach and wildlings were present along the back of the adjacent sand dunes.

Needlebush (*Hakea sericeus*) is a threat to the ecological integrity of the Reserve. This plant has become invasive in many seral and gumland-type habitats in the northern North Island. It is particularly problematic on Great Barrier Island, where it is a rapid coloniser following fires. Although currently present in small quantities, needlebush together with climbing asparagus (*Asparagus scandens*) have the potential to adversely affect the ecology of the Reserve.

Cooks Beach and Maramaratōtara Bay (to the west) are likely to act as sources of pest plants that could invade Shakespeare Cliff Reserve, although it is acknowledged that significant efforts have

Table 2: Environmental weed totals in the different plant groups (marked 'M' in Appendix).

Plant group/life form	No. of species
Woody trees and shrubs	14
Dicot & monocot vines and scramblers	8
Non-woody dicots	6
Monocots (other than vines and scramblers)	16
Total	44

been made to control pest plants in the dunes at Cooks Beach and also wilding pines and needlebush at Maramaratōtara Bay. Pampas (*Cortaderia jubata*, *C. selloana*), agapanthus (*Agapanthus praecox*), climbing asparagus and cotoneaster (*Cotoneaster glaucophylla*) are present in high densities, particularly along coastal cliffs and rocky headlands at Maramaratōtara Bay, as well as in residential gardens. The most aggressive weed species are marked "M" in the Appendix and their totals in the different life-forms are listed in Table 2.

Funding from the Department of Conservation Community Fund and TCDC is paying for a contractor to control agapanthus on the dunes at Cooks Beach with a view to controlling species such as yucca (*Yucca gloriosa*), fennel (*Foeniculum vulgare*), coast banksia (*Banksia integrifolia*), gazania (*Gazania linearis*), arctotis (*Arctotis stoechadifolia*) and other "garden escapes". Unfortunately, there are no Council resources currently available to continue pest plant control at Shakespeare Cliff Reserve. It is now up to local volunteers to manage key pest species.

Notes on some resident indigenous fauna

Cooks Beach and Maramaratōtara Bay support at least three threatened species of birds: New Zealand dotterel (*Charadrius obscurus aquilonius*; At Risk-Recovering), red-billed gull (*Larus novaehollandiae scopulinus*; At Risk-Declining) and variable oystercatcher (*Haematopus unicolor*; At Risk-Recovering) (Fig. 22). Caspian tern (*Hydroprogne caspia*; Threatened-Nationally Vulnerable) has been observed flying overhead on a couple of occasions (N. Goldwater, pers. obs). Reef heron (*Egretta sacra sacra*; Threatened-Nationally endangered) is an occasional visitor to the rocky reefs and rock stacks at the western end of Maramaratōtara Bay. North Island fernbird (*Bowdleria punctata vealeae*; At Risk-Declining) has been recorded from shrubland near the top of the Reserve and also from saltmarsh adjacent to Cook Stream (A. Smaill, pers. obs.)³. There is also a population of banded rail (*Gallirallus philippensis*; At Risk-Declining) which lives in this saltmarsh (A. Smaill and A. Henry, pers. obs.).

³ Threat rankings for indigenous birds are from Robertson *et al.* (2017).



Fig. 22. Variable oystercatcher, adult and a near-adult chick, feeding at Cook Stream mouth. Photo: EKC, 12 Feb 2020.

The stream that discharges into Maramaratōtara Bay supports longfin eel (*Anguilla dieffenbachii*), shortfin eel (*A. australis*), and whitebait species such as inanga (*Galaxias maculatus*) and banded kōkopu (*G. fasciatus*). In early 2017, a large banded kōkopu and a smallish shortfin eel were observed in a secluded and relatively isolated pool near the wetland bordering Maramaratōtara Bay (N. Goldwater, pers. obs.). The intermittent stream that drains into Cooks Beach from Shakespeare Reserve is well-buffered and shaded by overhanging native vegetation, and normally supports a small population of banded kōkopu in the small pools next to the footbridge. Sadly, when last visited on 7 March 2020, these pools had completely dried out due to the extended drought. No doubt, juvenile fish will recolonise these pools once the wet weather arrives. During a large high tide on the 12 February 2020 a large school of piper (*Hemiramphus intermedius*) was present by the footbridge (EKC, pers. obs.).

Two species of native skink have been seen at nearby Maramaratōtara Bay: shore skink (*Oligosoma smithii*; At Risk-Declining) and moko skink (*O. moco*; At Risk-Relict)⁴, the latter of which was found dozing under a dense carpet of exotic iceplant (*Carpobrotus chilensis*) (N. Goldwater, pers. obs.).

Pest mammals

The usual suite of mammalian predators is present in the Reserve and the surrounding landscape, including rats (*Rattus* spp.), house mice (*Mus musculus*), stoats (*Mustela erminea*), feral cats (*Felis catus*), and brushtail possums (*Trichosurus vulpecula*). Rabbits (*Oryctolagus cuniculus*) are also present in the Reserve and are significant browsers

of palatable indigenous plants such as karamū and pīngao. An operation to control rabbits was undertaken using the toxic bait Pindone (pre-calicivirus), although it appears that rabbit numbers have since recovered (A. Smaill, pers. comm.). Fortunately, there is considerable interest and enthusiasm in the local community to control mammalian pests for the benefit of indigenous biodiversity. As a result, a group has been recently established – The Purangi Conservation Trust – which is currently managing an extensive network of traps extending from the western end of Maramaratōtara Bay to farmland behind the western end of Cooks Beach. It would be beneficial if the Trust could eventually include Shakespeare Cliff Reserve in its remit, given that regular control in the Reserve is currently not taking place.

Some Recommendations

The large headland and adjoining estuaries and dune areas are dominated by regenerating indigenous vegetation that supports a wide range of indigenous local biota, including nationally threatened flora and fauna. Some recommendations:

- The local conservation groups, residents and bach owners have been doing a very good job. However, some inappropriate native plantings should be removed, and more weed control is required. The tall maritime pine at the north end of Cooks Beach should be removed as its seedlings are a constant weed threat, along with a few remaining pines on the headland, as seen in Fig. 3
- A specific survey should be carried out to ascertain whether the critically endangered *Olearia pachyphylla* is still present on the headland – best to carry this out at flowering time (Feb-Apr) to distinguish it from the similar-looking *O. townsonii*.
- The area of mown grass at the western end of Cooks Beach should be decreased to allow the expansion of the estuarine vegetation to provide a better buffer to the estuary itself along with its flora and fauna. This widening should be quite easy to achieve because some of the estuarine species are currently trying to invade the lawn by themselves, e.g. the indigenous sedge *Machaerina juncea* near the footbridge.
- The mown grass area on the upper slopes could also be further reduced by assisting the native vegetation to regenerate into it; thereby increasing the native vegetation and reducing the mown lawn.

⁴ Threat rankings for indigenous lizards are from Hitchmough *et al.* (2016).

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Appendix: Shakespeare Cliff Reserve and environs, Mercury Bay Tiaki Mauri BioBlitz results - vascular plant list.

Key

species names in **bold** = species collected/recorded for Mercury Bay by Banks & Solander in 1769

** NZ native species outside of its natural range/habitat (most of these should be removed)

x present

a abundant

la locally abundant

c common

f frequent

o occasional

lc locally common

l local

s scarce (<5 plants seen)

(AK) voucher specimen for AK herbarium collected during the BioBlitz but not yet accessioned

AS record from Adele Smaill, pers. comm. (not seen during BioBlitz)

BoV record Based on a Voucher specimen in AK herbarium (not seen during BioBlitz)

M recommended to be managed/eradicated

MM already being managed (to some extent)

NG 2013-19 record from Nick Goldwater (not seen during BioBlitz)

U unknown locally in the wild (no wild specimens seen during BioBlitz)

Appendix. Mercury Bay Tiaki Mauri BioBlitz results - list of native and exotic vascular plants and three bryophytes

Taxonomic Classification	Māori name and/or common name	Status	Invasive / inappropriate	Threatened / At Risk	Bush / grassland	Dune	Estuarine / wetland	Roadside	present but not seen during BioBlitz	Comments and vouchers
WILD SPECIES										
Ferns and Lycopods (36 + 0) (= indigenous + naturalised)										
<i>Adiantum cunninghamii</i>	huruhuru, common maidenhair	indigenous			l					
<i>Adiantum hispidulum</i>		indigenous			o					
<i>Asplenium flaccidum</i>	makawe, drooping spleenwort	indigenous			o					
<i>Asplenium haurakiense</i>		indigenous			s					(AK)
<i>Asplenium oblongifolium</i>	huruhuruwhenua, shining spleenwort	indigenous			o					
<i>Asplenium polyodon</i>	petako, sickle spleenwort	indigenous			s					
<i>Cyathea dealbata</i>	ponga, silver fern	indigenous			lc					
<i>Cyathea medullaris</i>	mamaku, black tree fern	indigenous			s					
<i>Dicksonia squarrosa</i>	whēkī	indigenous			s					kohekohe forest, E end Cooks Beach
<i>Doodia australis</i>	pukupuku	indigenous			lc					
<i>Gleichenia dicarpa</i>	tangle fern	indigenous			lc		lc			
<i>Hymenophyllum demissum</i>	mauku, filmy fern	indigenous			l					
<i>Hymenophyllum flabellatum</i>	filmy fern	indigenous			s					
<i>Hymenophyllum multifidum</i>	filmy fern	indigenous			s					
<i>Hymenophyllum nephrophyllum</i>	kidney fern	indigenous			l					
<i>Hymenophyllum sanguinolentum</i>	mauku, filmy fern	indigenous			l					
<i>Icarus filiformis</i> (<i>Blechnum filiforme</i>)	pānako, thread fern	indigenous			l					
<i>Lindsaea linearis</i>		indigenous			s					
<i>Lycopodiella cernua</i>	club moss	indigenous			lc			lc		
<i>Lycopodium deuterodensum</i>	puakarimu, club moss	indigenous			lc					
<i>Lygodium articulatum</i>	mangemange, bushman's mattress	indigenous			l					
<i>Microsorium pustulatum</i>	kōwaowao, hound's tongue fern	indigenous			o					
<i>Microsorium scandens</i>	mokimoki, fragrant fern	indigenous			s					
<i>Notogrammitis ciliata</i>	strap fern	indigenous			x					

Taxonomic Classification	Māori name and/or common name	Status	Invasive / inappropriate	Threatened / At Risk	Bush / grassland	Dune	Estuarine / wetland	Roadside	present but not seen during BioBlitz	Comments and vouchers
<i>Parablechnum novae-zelandiae</i> (<i>Blechnum novae-zelandiae</i>)	kiokio	indigenous			lc					
<i>Phlegmariurus billardierei</i>	whiri-o-Raukatauri, club moss	indigenous			s					epiphytic east end of Cooks Beach
<i>Pneumatopteris pennigera</i>	pākau, gully fern	indigenous			l					
<i>Polystichum neozelandicum</i>	pikopiko, shield fern	indigenous			o					
<i>Psilotum nudum</i>	whisk fern	indigenous			o					mainly in open by summit
<i>Pteridium esculentum</i>	rārahu, bracken	indigenous			lc	lc				
<i>Pteris macilenta</i>	sweet fern	indigenous			o					
<i>Pteris tremula</i>	turawera	indigenous			f					
<i>Pyrrosia elaeagnifolia</i>	leather-leaf fern	indigenous			f					terrestrial and epiphytic
<i>Tmesipteris elongata</i>	fork fern	indigenous			x					
<i>Tmesipteris sigmatifolia</i>	fork fern	indigenous			x					
<i>Tmesipteris tannensis</i>	fork fern	indigenous			x					
Conifers (2 + 2)										
<i>Dacrycarpus dacrydioides</i>	kahikatea	indigenous			o					
<i>Pinus pinaster</i>	maritime pine	naturalised	MM		o	o				most adults felled; AK 379556
<i>Pinus radiata</i>	radiata pine	naturalised	MM		o					most adults felled
<i>Podocarpus totara</i>	tōtara	indigenous			f					
Dicot Trees & Shrubs (53 + 13)										
<i>Acacia mearnsii</i>	black wattle	naturalised	M		l					AK 379563
<i>Alectryon excelsus</i> ssp. <i>excelsus</i>	tītoki	indigenous			x					
<i>Avicennia marina</i>	mānawa, mangrove	indigenous					lc			
<i>Banksia integrifolia</i>	coastal banksia	naturalised	M			x				
<i>Brachyglottis repanda</i> var. <i>repanda</i>	rangiora	indigenous			s					
<i>Carmichaelia australis</i>	mākaka, North Island broom	indigenous			s				AS	Flaxmill Bay cliffs north; Cook's Str Track
<i>Carpodetus serratus</i>	putaputawētā	indigenous			l					
<i>Coprosma lucida</i>	karamū, glossy karamu	indigenous			c					
<i>Coprosma macrocarpa</i> ssp. <i>minor</i>	coastal karamū	indigenous			f		f			

Taxonomic Classification	Māori name and/or common name	Status	Invasive / inappropriate	Threatened / At Risk	Bush / grassland	Dune	Estuarine / wetland	Roadside	present but not seen during BioBlitz	Comments and vouchers
<i>Coprosma macrocarpa</i> × <i>C. robusta</i>	karamū hybrid	indigenous			x					
<i>Coprosma repens</i>	taupata	indigenous			l					NW coast and pōhutukawa islands
<i>Coprosma rhamnoides</i>	twiggy coprosma	indigenous			c					
<i>Coprosma robusta</i>	karamū	indigenous			c					
<i>Coriaria arborea</i> var. <i>arborea</i>	tutu	indigenous			o					
<i>Corokia cotoneaster</i>	korokio	indigenous			o					
<i>Corynocarpus laevigatus</i>	karaka	indigenous			o					
<i>Cotoneaster glaucophyllus</i>	cotoneaster	naturalised	M		o					
<i>Dodonaea viscosa</i>	akeake	indigenous			o	lc	f			
<i>Dracophyllum sinclairii</i>	gumland grass tree	indigenous			l					above Flaxmill Bay in kānuka forest
<i>Dysoxylum spectabile</i>	kohekohe	indigenous			l					mainly at east end of Cooks Beach
<i>Eriobotrya japonica</i>	loquat	naturalised	M		o					
<i>Geniostoma ligustrifolium</i>	hangehange	indigenous			c		o			
<i>Griselinia lucida</i>	puka	indigenous			x					
<i>Hakea gibbosa</i>	downy hakea	naturalised	M		s				AS	x2, E side
<i>Hakea sericea</i>	needlebush	naturalised	MM		o					
<i>Hebe macrocarpa</i>	koromiko	indigenous			f					
<i>Hebe pubescens</i>	koromiko	indigenous			f					
<i>Hebe stricta</i>	koromiko	indigenous			o					
<i>Hedycarya arborea</i>	porokaiwhiri, pigeonwood	indigenous			f					
<i>Juglans ailantifolia</i>	Japanese walnut	naturalised	M					s		x1, Flaxmill Bay, by estuary
<i>Knightia excelsa</i>	rewarewa	indigenous			f					
<i>Kunzea robusta</i>	kānuka	indigenous		Nat. Vul.	a					
<i>Leptecophylla juniperina</i>	mingimingi, prickly mingimingi	indigenous			c					
<i>Leptospermum scoparium</i>	mānuka	indigenous		AR-Decl.	a					
<i>Leucopogon fasciculatus</i>	mingimingi, tall mingimingi	indigenous			a					
<i>Ligustrum sinense</i>	Chinese privet	naturalised	M		o					
<i>Melicytus ramiflorus</i>	māhoe	indigenous			o					

Taxonomic Classification	Māori name and/or common name	Status	Invasive / inappropriate	Threatened / At Risk	Bush / grassland	Dune	Estuarine / wetland	Roadside	present but not seen during BioBlitz	Comments and vouchers
<i>Metrosideros excelsa</i>	pōhutukawa	indigenous		Nat. Vul.	c					
<i>Myoporum laetum</i>	ngaio	indigenous			o					
<i>Myrsine australis</i>	māpou	indigenous			c		f			
<i>Olearia furfuracea</i>	akepiro	indigenous			lc					
<i>Olearia pachyphylla</i>	thick-leaved tree daisy	indigenous		Nat. Crit.	x				BoV	summit shrubland, <i>PJ de Lange</i> , 22 Sep 1992, AK 213612
<i>Olearia rani</i>	heketara	indigenous			lc					
<i>Olearia townsonii</i>	Coromandel tree daisy	indigenous			lc					
<i>Paraserianthes lophantha</i>	brush wattle	naturalised	M		l					AK 379656
<i>Pimelea longifolia</i>	kōkōmuka tāranga	indigenous		AR-Decl.	s					trackside, above Lonely Bay
<i>Pimelea villosa</i>	aute tāranga	indigenous		AR-Decl.		s				planted ones by the wild ones
<i>Piper excelsum</i> s.s.	kawakawa	indigenous			lc					
<i>Pittosporum crassifolium</i>	karo	indigenous			f					
<i>Pittosporum umbellatum</i>	haekaro	indigenous			f					
<i>Plagianthus divaricatus</i>	mākaka, saltmarsh ribbonwood	indigenous					o			
<i>Polygala myrtifolia</i>	sweet pea shrub	naturalised	MM		x				AS	above Cook Stream mouth
<i>Pomaderris amoena</i>	tauhinu	indigenous			f					
<i>Pomaderris kumeraho</i>	kūmarahou	indigenous			c					
<i>Pomaderris rugosa</i>	wrinkle-leaf pomaderris	indigenous		AR-Nat. Unc.	l			s		
<i>Prunus persica</i>	peach	naturalised					s			x3 seedling
<i>Pseudopanax arboreus</i>	whauwhaupaku, 5-finger	indigenous			f					
<i>Pseudopanax crassifolius</i> × <i>P. lessonii</i>	hybrid	indigenous			l					
<i>Pseudopanax lessonii</i>	houpara	indigenous			lc		f			
<i>Robinia pseudoacacia</i>	false acacia	naturalised	M		s					https://inaturalist.nz/observations/32936544
<i>Solanum ?aviculare</i>	poroporo	indigenous							AS	wild in a pōhutukawa 'island'
<i>Sophora microphylla</i>	kowhai	indigenous			x				NG	
<i>Styphelia nesophila</i> (<i>Leucopogon fraseri</i>)	pātōtara	indigenous			s					
<i>Ulex europaeus</i>	gorse	naturalised	M		lc					

Taxonomic Classification	Māori name and/or common name	Status	Invasive / inappropriate	Threatened / At Risk	Bush / grassland	Dune	Estuarine / wetland	Roadside	present but not seen during BioBlitz	Comments and vouchers
<i>Vitex lucens</i>	pūriri	indigenous			f					
Weinmannia sylvicola	tōwai	indigenous			f					
Dicot Herbs (17 + 64)										
<i>Arctotheca calendula</i>	Cape weed	naturalised			s				NG	https://inaturalist.nz/observations/16784979
<i>Atriplex prostrata</i>	orache	naturalised					x			
<i>Cakile maritima</i>	sea rocket	naturalised				f	o			
<i>Centaureum erythraea</i>	centaury	naturalised			o					
<i>Centella uniflora</i>	centella	indigenous			l					
<i>Cerastium fontanum</i> ssp. <i>vulgare</i>	mouse ear chickweed	naturalised			o				NG	
<i>Chenopodium album</i>	fathen	naturalised			x					
<i>Cirsium arvense</i>	Californian thistle	naturalised			x					
<i>Cirsium vulgare</i>	Scotch thistle	naturalised			o					
<i>Crepis capillaris</i>	hawkesbeard	naturalised			x	x				
<i>Daucus carota</i>	wild carrot	naturalised			l					
Dichondra repens	creeping dichondra	indigenous			l					
Drosera auriculata	sundew	indigenous			o				NG	
Epilobium billardioreanum ssp. <i>cinereum</i>	willowherb	indigenous			x			l		
<i>Erigeron canadensis</i>	smooth fleabane	naturalised				l				AK 379555
<i>Erigeron karvinskianus</i>	Mexican daisy	naturalised	M		x					
<i>Erigeron sumatrensis</i>	broad-leaved fleabane	naturalised			o	o		o		
Euchiton japonicus (<i>Gnaphalium gymnocephalum</i>)	creeping cudweed	indigenous			x					
<i>Euphorbia maculata</i>	spotted spurge	naturalised						l		
<i>Euphorbia peplus</i>	milkweed	naturalised			x					
<i>Foeniculum vulgare</i>	fennel	naturalised			x			lc		
<i>Galium aparine</i>	cleavers	naturalised			x				NG	
<i>Gamochaeta coarctata</i>		naturalised			x					

Taxonomic Classification	Māori name and/or common name	Status	Invasive / inappropriate	Threatened / At Risk	Bush / grassland	Dune	Estuarine / wetland	Roadside	present but not seen during BioBlitz	Comments and vouchers
<i>Gamochaeta simplicicaulis</i>	cudweed	naturalised			x					
<i>Geranium dissectum</i>	cut-leaved cranesbill	naturalised			s				NG	
<i>Geranium homeanum</i>		indigenous			x					
<i>Geranium molle</i>	dove's foot cranesbill	naturalised			o					
<i>Gonocarpus incanus</i>	piripiri	indigenous			l					https://inaturalist.nz/observations/32936720
<i>Haloragis erecta</i> ssp. <i>erecta</i>	toatoa, shrubby haloragis	indigenous			x					
<i>Hibiscus trionum</i> agg.	puarangi	naturalised			s				NG	single patch, upper grass area; https://inaturalist.nz/observations/16784335
<i>Hypochaeris radicata</i>	catsear	naturalised			x					
<i>Jacobaea vulgaris</i>	ragwort	naturalised			l					
<i>Lactuca virosa</i>	acrid lettuce	naturalised			l					AK 379652
<i>Lapsana communis</i>	nipplewort	naturalised			x				NG	
<i>Leontodon saxatilis</i>	hawkbit	naturalised			x					
<i>Lepidium didymum</i>	twin cress	naturalised			x					
<i>Leucanthemum vulgare</i>	oxeye daisy	naturalised			x					
<i>Linum trigynum</i>	yellow flax	naturalised			x					
<i>Lobelia anceps</i>	punakuru, shore lobelia	indigenous			x		x			
<i>Lotus pedunculatus</i>	lotus	naturalised			lc		x			
<i>Lotus suaveolens</i>	hairy birdsfoot trefoil	naturalised			x					
<i>Lysimachia arvensis</i> s.s.	scarlet pimpernel	naturalised			x					
<i>Medicago lupulina</i>	black medick	naturalised			x					
<i>Medicago nigra</i>	bur medick	naturalised			x					
<i>Melilotus indicus</i>	King Island melilot	naturalised				l	l			
<i>Modiola caroliniana</i>	creeping mallow	naturalised			x					
<i>Myosotis sylvatica</i>	forget-me-not	naturalised			o				NG	https://inaturalist.nz/observations/16785182
<i>Oenothera glazioviana</i>	evening primrose	naturalised	MM			lc				AK 379612
<i>Orobanche minor</i>	broomrape	naturalised			l	l				
<i>Oxalis rubens</i>	dune oxalis	indigenous				o				
<i>Peperomia urvilleana</i>		indigenous			o					

Taxonomic Classification	Māori name and/or common name	Status	Invasive / inappropriate	Threatened / At Risk	Bush / grassland	Dune	Estuarine / wetland	Roadside	present but not seen during BioBlitz	Comments and vouchers
<i>Persicaria hydropiper</i>	water pepper	naturalised					x			
<i>Phytolacca octandra</i>	inkweed	naturalised	M		x					
<i>Plantago lanceolata</i>	narrow-leaved plantain	naturalised			x					
<i>Plantago major</i>	broad-leaved plantain	naturalised			x				NG	
<i>Polycarpon tetraphyllum</i>	allseed	naturalised			x					
<i>Potentilla indica</i>	Indian strawberry	naturalised			s					
<i>Prunella vulgaris</i>	selfheal	naturalised			f					
<i>Pseudognaphalium luteoalbum</i>	pukatea, Jersey cudweed	indigenous			x			x		
<i>Ranunculus reflexus</i>	mārūrū,	indigenous			s					
<i>Ranunculus repens</i>	creeping buttercup	naturalised	M		x					
<i>Rumex conglomeratus</i>	clustered dock	naturalised			x					
<i>Sagina procumbens</i>	procumbent pearlwort	naturalised			x					
<i>Salicornia quinqueflora</i>	ureure, glasswort	indigenous					o			
<i>Samolus repens</i> var. <i>repens</i>	māakoako, sea primrose	indigenous					l			
<i>Senecio bipinnatisectus</i>	Australian fireweed	indigenous			x					
<i>Silene gallica</i>	catchfly	naturalised			x					
<i>Solanum nigrum</i>	pōporo, black nightshade	naturalised			x					
<i>Sonchus asper</i>	raurōroa, prickly sow thistle	naturalised			x					
<i>Sonchus oleraceus</i>	rauriki, sow thistle	naturalised			x					
<i>Spergula arvensis</i>	spurrey	naturalised			x					
<i>Stellaria media</i>	kohukohu, chickweed	naturalised			x					
<i>Symphyotrichum subulatum</i> (<i>Aster subulatus</i>)	sea aster	naturalised				x	x			
<i>Taraxacum officinale</i>	tohetaka, tawao, dandelion	naturalised			x					
<i>Trifolium campestre</i>	hop trefoil	naturalised			x					
<i>Trifolium dubium</i>	yellow clover	naturalised			x					
<i>Trifolium pratense</i>	red clover	naturalised			x	x				
<i>Trifolium repens</i>	white clover	naturalised			x	x				
<i>Verbena incompta</i>	purple-top	naturalised	M		x					

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<i>Veronica arvensis</i>	field speedwell	naturalised			o				NG	
Wahlenbergia violacea	rimuroa, harebell	indigenous			l					https://inaturalist.nz/observations/39485344
Mistletoes (1 + 0)										
<i>Korthalsella salicornioides</i>	dwarf mistletoe	indigenous		Nat. Crit.	s				AS	East side
Dicot Climbers and related Trailers (11 + 9)										
<i>Calystegia sepium</i> subsp. <i>roseata</i>	pink bindweed	indigenous			l					
<i>Calystegia sepium</i> ssp. <i>roseata</i> x <i>C. silvatica</i>	hybrid bindweed	naturalised			x					
<i>Calystegia sepium</i> ssp. <i>roseata</i> x <i>C. tuguriorum</i>	hybrid bindweed	indigenous			x					AK 379567
<i>Calystegia soldanella</i>	panahi, shore bindweed	indigenous				lc				
<i>Carpobrotus chilensis</i>	ice plant	naturalised	MM			[x]			NG	locally eradicated at BioBlitz end; still at E end of Cooks Beach
<i>Clematis paniculata</i>	puawānanga, white clematis	indigenous			s					
<i>Disphyma australe</i>	horokaka, NZ ice plant	indigenous			l				AS/NG	Flaxmill Bay, outlying rock
<i>Hedera helix</i>	ivy	naturalised	M		s					x1 juvenile; near Cook Stream footbridge
<i>Ipomoea cairica</i> **		indigenous	M					x		
<i>Jasminum polyanthum</i>	jasmine	naturalised	M				lc			near Cook Stream footbridge
<i>Lonicera japonica</i>	Japanese honeysuckle	naturalised	M				l			
<i>Metrosideros diffusa</i>	aka, white rata	indigenous		Nat. Vul.	l				NG	shaded cliff nr mouth of Cook Stream (AK); https://www.inaturalist.org/observations/19739460
<i>Metrosideros perforata</i>	aka, small white rata	indigenous		Nat. Vul.	lc					
<i>Muehlenbeckia complexa</i>	pōhuehue, wire vine	indigenous			l	f	f			
<i>Parsonsia</i> ? <i>heterophylla</i>	akakiore, NZ jasmine	indigenous			o					
<i>Rubus cissoides</i>	tātārāmoa, bush lawyer	indigenous			s					
<i>Rubus fruticosus</i> agg.	blackberry	naturalised	M		o			x		
<i>Rumex sagittatus</i>	climbing dock	naturalised	M					l		Flaxmill Bay
<i>Vinca major</i>	periwinkle	naturalised	M		x					by Flaxmill Bay toilets

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<i>Vitis vinifera</i>	grape	naturalised	M					I		Flaxmill Bay
Monocots: Trees, Shrubs, Herbs (except Climbers, Rushes, Sedges, Orchids & Grasses) (8 + 11)										
<i>Apodasmia similis</i> (<i>Leptocarpus similis</i>)	oioi, jointed rush	indigenous					a			
<i>Agapanthus praecox</i> ssp. <i>orientalis</i>	agapanthus	naturalised	M		o					
<i>Aristea ecklonii</i>	aristea	naturalised	M		I					near Cook Stream footbridge. AK 379657
<i>Arthropodium cirratum</i>	rengarenga	indigenous			I					
<i>Astelia banksii</i>	kōwharawhara	indigenous			Ic					
<i>Cordyline australis</i>	tī, cabbage tree	indigenous			f					
<i>Cordyline pumilio</i>	tī rauriki, dwarf cabbage tree	indigenous			o					
<i>Crocasmia</i> × <i>crocosmiiflora</i>	montbretia	naturalised	M		I					
<i>Dianella nigra</i>	tūrutu	indigenous			c					
<i>Freesia refracta</i>	freesia	naturalised						I	NG	road cutting
<i>Gladiolus undulatus</i>	wild gladiolus	naturalised	M		o	I				
<i>Hedychium gardnerianum</i>	Kahili ginger	naturalised	MM		o		o			
<i>Lilium formosanum</i>	Formosan lily	naturalised	MM		f	Ic	o			
<i>Phormium tenax</i>	harakeke, NZ flax	indigenous			Ic		f			
<i>Rhopalostylis sapida</i>	nikau	indigenous			o					
<i>Sisyrinchium micranthum</i>	purpled-eyed grass	naturalised			s				NG	https://naturalist.nz/observations/32323024
<i>Wachendorfia thyrsiflora</i>	red root	naturalised	M				I			x1 clump, Flaxmill Bay; much larger patch on S side of road
<i>Watsonia meriana</i> 'Bulbillifera'	bulbil watsonia	naturalised	M				Ic			
<i>Zantedeschia aethiopica</i> 'Green Goddess'	green goddess	naturalised	M				I			Flaxmill Bay
Monocots: Climbers (1 + 1)										
<i>Asparagus scandens</i>	climbing asparagus	naturalised	MM		o					
<i>Ripogonum scandens</i>	kareao, supplejack	indigenous			o					
Monocots: Rushes (3 + 2)										
<i>Juncus australis</i>		indigenous			o					
<i>Juncus kraussii</i> ssp. <i>australiensis</i>	sea rush	indigenous					a			

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<i>Juncus pallidus</i>		indigenous					l			near footbridge on Cook Stream
<i>Juncus tenuis</i> ssp. <i>dichotomus</i>		naturalised			lc		x			in mown lawn by estuary
<i>Juncus tenuis</i> ssp. <i>tenuis</i>	track rush	naturalised			x					
Monocots: Sedges (26 + 3)										
<i>Carex banksiana</i>		indigenous			s				NG	alongside walking track
<i>Carex divulsa</i>	grey sedge	naturalised	M		s					Under plantings, W-side of mown lawn by <i>Meryta sinclairii</i>
<i>Carex flagellifera</i>	mānaia, Glen Murray tussock	indigenous			o					
<i>Carex lambertiana</i>		indigenous			f					
<i>Carex lessoniana</i>	rautahi	indigenous				lc				Very robust form; (AK)
<i>Carex pumila</i>	sand sedge	indigenous				l				Flaxmill Bay
<i>Carex uncinata</i>	kamu	indigenous			l					
<i>Cyperus brevifolius</i>	globe sedge	naturalised					x			
<i>Cyperus eragrostis</i>	puketangata, umbrella sedge	naturalised	M				x			
<i>Eleocharis acuta</i>	sharp spike sedge	indigenous					l			
<i>Eleocharis gracillis</i>	slender spike sedge	indigenous					l			Flaxmill Bay
<i>Ficinia nodosa</i>	wiwi, knobby clubrush	indigenous				a				
<i>Ficinia spiralis</i>	pīngao, golden sand sedge	indigenous		AR-Decl.		f				Especially at Lonely Bay
<i>Gahnia lacera</i>	tarangārara, bamboo sedge	indigenous			c					
<i>Gahnia setifolia</i>	māpere	indigenous			l					
<i>Isolepis cernua</i>	slender clubrush	indigenous					l			
<i>Lepidosperma australe</i>	square-stemmed sedge	indigenous			s					
<i>Lepidosperma laterale</i>	sword sedge	indigenous			f					
<i>Machaerina arthropphylla</i>	twig sedge	indigenous					lc			
<i>Machaerina articulata</i>	jointed twig sedge	indigenous					l			
<i>Machaerina juncea</i>	twig sedge						la			Cook Stream estuary
<i>Machaerina rubiginosa</i>	common twig sedge	indigenous					lc			Flaxmill Bay
<i>Machaerina sinclairii</i>	pēpepe	indigenous			lc					
<i>Morelotia affinis</i>		indigenous			f					

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<i>Schoenoplectus pungens</i>	three-square	indigenous					I			Flaxmill Bay. (AK)
<i>Schoenoplectus tabernaemontani</i>	kāpūngāwhā, lake clubrush	indigenous					I			Flaxmill Bay. (AK)
<i>Schoenus apogon</i>		indigenous			o					open, low shrublands. AK 379551
<i>Schoenus tendo</i>	wīwī	indigenous			a					under kānuka
<i>Tetraria capillaris</i>		indigenous			lc					under kānuka. AK 379554
Monocots: Orchids (8 + 0)										
<i>Acianthus sinclairii</i>		indigenous			s				NG	infrequent on western cliff track; https://www.inaturalist.org/observations/42936032
<i>Bulbophyllum pygmaeum</i>	piripiri	indigenous			o					
<i>Earina mucronata</i>	peka-a-waka	indigenous			o					
<i>Microtis unifolia</i>	onion orchid	indigenous			o			o		
<i>Orthoceras novae-zelandiae</i>		indigenous			s				NG	x1, on side of track to Lonely Bay; https://www.inaturalist.org/observations/42936055
<i>Pterostylis banksii</i>	tutukiwi	indigenous			o					
<i>Thelymitra longifolia</i>	māikuku, white sun orchid	indigenous			o					
<i>Thelymitra</i> sp.	sun orchid	indigenous			o			x		
Monocots: Grasses (11 + 35)										
<i>Agrostis capillaris</i>	browntop	naturalised			x					
<i>Agrostis stolonifera</i>	creeping bent	naturalised			I				NG	
<i>Aira caryophyllea</i>	silvery hair grass	naturalised			x					
<i>Anthoxanthum odoratum</i>	sweet vernal	naturalised			lc					
<i>Axonopus fissifolius</i>	carpet grass	naturalised			I					
<i>Briza maxima</i>	large quaking grass	naturalised			x					
<i>Briza minor</i>	shivery grass	naturalised			x			x		
<i>Bromus catharticus</i>	prairie grass	naturalised			x					
<i>Bromus diandrus</i>	ripgut brome	naturalised			x	x				
<i>Bromus lithobius</i>	Chilean brome	naturalised			x					AK 379654

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<i>Catapodium rigidum</i>	hard grass	naturalised				x				
<i>Cenchrus clandestinus</i>	kikuyu grass	naturalised	M		x			x		
<i>Cortaderia jubata</i>	purple pampas grass	naturalised	M				l			AK 379653
<i>Cortaderia selloana</i>	pampas grass	naturalised	M		l		o			
<i>Cynodon dactylon</i>	Indian doab	naturalised				f	f			
<i>Dactylis glomerata</i>	cocksfoot	naturalised			f					
<i>Deyeuxia quadriseta</i>		indigenous		AR-Decl.	l					clay track gutter near summit. AK 379550
<i>Dichanthelium lanuginosum</i> (<i>Panicum huachucae</i>)		naturalised			lc					Open low shrubland.
<i>Dichelachne crinita</i>	long-hair plume grass	indigenous			lc					open areas by summit. AK 379621
<i>Digitaria aequiglumis</i>		naturalised						l		Apparently only the fourth collection for New Zealand. AK 379553
<i>Digitaria sanguinalis</i>	summer grass	naturalised			f					
<i>Ehrharta erecta</i>	veldt grass	naturalised	M		x					
<i>Holcus lanatus</i>	Yorkshire fog	naturalised			l					
<i>Isachne globosa</i>	swamp millet	indigenous					lc			
<i>Lachnagrostis billardiarei</i>	sand wind grass	indigenous				f				
<i>Lachnagrostis filiformis</i>	perehia	indigenous						x		AK 379552
<i>Lagurus ovatus</i>	haretail	naturalised				lc	f			
<i>Lolium arundinaceum</i>	tall fescue	naturalised					lc			
<i>Lolium perenne</i>	perennial ryegrass	naturalised			la					
<i>Lolium rigidum</i>	annual ryegrass	naturalised				x				(AK)
<i>Microlaena stipoides</i>		indigenous			la					
<i>Oplismenus hirtellus</i>	panic grass	indigenous			l					
<i>Panicum dichotomiflorum</i>	smooth witch grass	naturalised						l		(AK)
<i>Paspalum dilatatum</i>	paspalum	naturalised			x					
<i>Paspalum distichum</i>	Mercer grass (tbc)	naturalised					x			
<i>Paspalum urvillei</i>	Vasey grass	naturalised			x		x			
<i>Paspalum vaginatum</i>	saltwater paspalum	naturalised	M			o	lc			

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<i>Poa anceps</i>	broad-leaved poa	indigenous			l					
<i>Rytidosperma biannulare</i>	danthonia	indigenous			x					
<i>Rytidosperma pilosum</i>	danthonia	naturalised			x					
<i>Rytidosperma racemosum</i>	danthonia	naturalised			x					
<i>Setaria parviflora</i>	knot-root bristle grass	naturalised						x		
<i>Spinifex sericeus</i>	kōwhangatara, silvery sand grass	indigenous				la				
<i>Sporobolus africanus</i>	ratstail	naturalised			o					
<i>Stenotaphrum secundatum</i>	buffalo grass	indigenous				lc				
<i>Vulpia bromoides</i>	vulpia hair grass	naturalised			x	x				
Bryophytes (3 + 0)										
<i>Dicranoloma billardieri</i>		indigenous			x					
<i>Ptychomnion aciculare</i>	pipe cleaner moss	indigenous			la					under kānuka
<i>Spruceanthus olivaceus</i>		indigenous			x					AK 379611
PLANTED SPECIES										
Planted conifers (7 + 1)										
<i>Agathis australis</i> U	kauri	indigenous		Nat. Vul.	o					to 15 m tall
<i>Dacrycarpus dacrydioides</i>	kahikatea	indigenous			x					
<i>Dacrydium cupressinum</i> U	rimu	indigenous			x					
<i>Libocedrus plumosa</i> U	kawaka	indigenous			x					to 8m tall
<i>Phyllocladus trichomanoides</i> U	tānekaha	indigenous			o					
<i>Pinus pinaster</i>	maritime pine	exotic	M		x					x1 large tree
<i>Podocarpus totara</i>	tōtara	indigenous			x					
<i>Prumnopitys taxifolia</i> U	mataī	indigenous			x					
Planted dicots (32 + 9)										
<i>Alectryon excelsus</i>	tītoki	indigenous								
<i>Arbutus unedo</i> U	strawberry tree	exotic			s					single tree

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<i>Banksia integrifolia</i>	coastal banksia	exotic	M		s					single tree
<i>Beilschmiedia tarairi</i> U	taraire	indigenous			o				NG	southern slopes of reserve
<i>Cannabis sativa</i> U	marijuana	exotic			x				AS	NE faces
<i>Carpodetus serratus</i>	putaputawētā, marble leaf	indigenous			x					
<i>Coprosma repens</i>	taupata	indigenous			x					planted NW of large grass area
<i>Coprosma robusta</i>	karamū	indigenous			x					
<i>Corokia × virgata</i> ** U	hybrid corokio	indigenous	M		x					
<i>Corymbia ficifolia</i> U	red-flowering gum	exotic			s					x1 large tree, Flaxmill Bay
<i>Dodonaea viscosa</i>	akeake	indigenous			x	x				
<i>Grevillea robusta</i> U	silky oak	exotic	M		x					x1 large tree
<i>Griselinia littoralis</i> ** U	kāpuka	indigenous	M		x					present naturally in the Coromandel at higher elevations
<i>Griselinia lucida</i>	pukanui	indigenous			x					
<i>Hebe stricta</i>	koromiko	indigenous			x					
<i>Hedycarya arborea</i>	porokaiwhiri	indigenous			x					
<i>Hoheria populnea</i> U	houhere, lacebark	indigenous			x					
<i>Knightia excelsa</i>	rewarewa	indigenous			x					
<i>Leptospermum morrisonii</i> 'Copper Sheen' U	shiny tea tree	exotic	M		s					x1 tree
<i>Melicope ternata</i> U	wharangi	indigenous			x					
<i>Melicytus novae-zelandiae</i> U	coastal māhoe	indigenous			x					
<i>Melicytus ramiflorus</i>	māhoe	indigenous			x					
<i>Meryta sinclairii</i> ** U	pukanui	indigenous	M		x					
<i>Metrosideros excelsa</i>	pōhutukawa	indigenous			x	x				some large group plantings in upper grass area (pōhutukawa 'islands')
<i>Myoporum laetum</i>	ngaio	indigenous			x					
<i>Olearia albida</i> U	tanguru	indigenous			x					
<i>Olearia traversiorum</i> ** U	Chatham Island tree daisy	indigenous	M		x					
<i>Pimelea villosa</i>	aute tāranga	indigenous				lc				planted by wild ones
<i>Pisonia brunoniana</i> U	parapara	indigenous		AT-Relict	x				AS	top grass area, NW gully

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<i>Pittosporum eugenioides</i> ** U	tarata, lemonwood	indigenous	M		x					the northern South Island form
<i>Pittosporum tenuifolium</i> U	kōhūhū	indigenous			x					
<i>Pittosporum</i> 'Stephens Island' ** U		indigenous	M		x					
<i>Planchonella costata</i> U	tawāpou	indigenous			x				AS	seed ex Stanley I; top road, W side
<i>Populus alba</i> U	white poplar	exotic	M				s			root suckers present
<i>Populus nigra</i> 'Italica' U	Lombardy poplar	exotic	MM				[s]			x1 tree in Flaxmill Bay wetland, recently killed
<i>Pseudopanax arboreus</i>	whauwhaupaku	indigenous			x					
<i>Pseudopanax crassifolius</i> × <i>P. lessonii</i>		indigenous			x					
<i>Pseudopanax laetus</i> ** U		indigenous	M		o					present naturally in the Coromandel at higher elevations
<i>Sophora</i> ? <i>chathamica</i>	kōwhai	indigenous			l				NG	
<i>Sophora tetraptera</i> ** U	kōwhai	indigenous	M		l					trees, between road and Cook Stream footbridge
<i>Syzygium smithii</i> U	monkey apple	exotic	M		s					x1, Flaxmill Bay, near toilets
Planted monocots (7 + 2)										
<i>Alpinia zerumbet</i> U	coral ginger	exotic			s					x1 clump (sprayed?), near footbridge
<i>Arthropodium bifurcatum</i> ** U	island rengarenga	indigenous	M		x					in planted pōhutukawa islands
<i>Astelia chathamica</i> ** U	kakaha	indigenous	M		x					in planted pōhutukawa islands
<i>Cordyline australis</i>	tī, cabbage tree	indigenous			x					
<i>Ficinia nodosa</i>	wīwī, knobby clubrush	indigenous				x				
<i>Ficinia spiralis</i>	pīngao	indigenous				x				back of sand dunes
<i>Phormium cookianum</i> ** U	wharariki, mountain flax	indigenous	M		lc					extensive plantings; naturally in the Coromandel at higher altitudes
<i>Rhopalostylis sapida</i>	nikau	indigenous			x					
<i>Xanthorrhoea johnsonii</i> U	grass tree	exotic	M		s					x1, trunkless